

H E A D S

Course of Lectures

ON THE

PHILOSOPHY

OF

Chemistry

AND

Natural History:

TO BE DELIVERED

By HENRY MOYES, M. D.

The Course will consist of Twenty-one Lectures, and will be illustrated
by Specimens and Experiments.

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EXPERIMENTAL PHILOSOPHY

HEADS.

OF A

COURSE OF LECTURES, &c.

PART I.

OF HEAT.

- 1 **H** EAT—Notions of the Ancients about it. Lecture 1.
- 2 Heat essentially the same, however produced.
- 3 Observations relating to the Heat of the Sun, &c.
- 4 Tendency in inanimate Bodies to acquire the Temperature of the surrounding Medium.
- 5 Tendency in Animals to preserve nearly the same Degree of Heat in different Temperatures of the surrounding Medium.—Various Facts considered, which seem to depend upon this Principle.
- 6 Heat and Cold only relative Terms.—This Doctrine illustrated, and by it many interesting Facts explained.
- 7 Some Bodies *conduct* Heat more readily than others.—Advantages derived from this Property.—Some Facts depending upon it accounted for.
- 8 Power of Bodies to conduct Heat sensibly affected by their Colour.—Some Facts explained on this Principle.
- 9 Heat *expands* all Bodies.—The Advantages and Disadvantages of this Expansion in the Arts and in common Life. Lecture 11.

- 10 Theory, Construction, and Graduation, of THERMOMETERS.—Observations made with Thermometers on different Scales, how compared.
- 11 Some Instances of great degrees of Cold, both natural and artificial, ascertained by the Thermometer.
- 12 How Degrees of Heat, too intense for the Thermometer, may be readily ascertained.
- 13 Of the *absolute* Heat of Bodies, and the Laws observed in the heating and cooling them.
- 14 Observations with Regard to the *Gravity* of Heat, and the Opinions of Philosophers concerning it.
- 15 The almost infinite *Divisibility* of *Matter* proved by a Number of Facts, collected from the Operations of Nature and of Art.

Lecture
III.

- 16 FLUIDITY, its Theory—Heat the sole Cause of it.
- 17 The Doctrine of LATENT HEAT illustrated and explained—various Phenomena which are to be accounted for by it only.
- 18 The Nature and Origin of STEAM.
- 19 The Theory and Phenomena of BOILING explained.
- 20 All Fluids boil with less Heat in Vacuo than in open Air.
- 21 Spontaneous EVAPORATION accounted for.
- 22 Cold produced by Evaporation.—Advantages which arise from this Law of Nature.
- 23 The Quantity of Water evaporated in a Day from a given Surface.

Lecture
IV.

- 24 Concerning IGNITION, and the Connection between Heat and Light.
- 25 Of COMBUSTION, and the Principle of Inflammability.—Why Air is necessary to the Existence of Flame.—Some Bodies more inflammable than others.
- 26 Concerning the Production of LIGHT.
- 27 The *Materiality* of Light demonstrated.

28 The Sun diminishing by the continual Emission of Light, and the Rate of this Diminution examined.

29 Of the *Rarity* of Light, and the Distances between its Particles.

30 Of natural PHOSPHORI in general, and of the Light emitted by Diamonds and the Bolognian Stone.

Lecture
V.

31 Of a particular Sort of *artificial* Phosphorus—the Method of preparing it, and the various Discoveries to which it has led.

32 Heat and Light different Substances—enter into the Composition of many Bodies, and have the Property of dislodging one another.

33 Facts and Observations relating to the Light emitted by *putrescent Substances*.—The Cause of this Phænomenon explained and illustrated.

34 The luminous Appearance of the Sea described and accounted for.

35 Of the IGNIS FATUUS in general—its Phænomena, History, and Cause.

36 Of the component Parts of LIGHT.

Lecture
VI.

37 Of COLOURS in general.

38 The natural Colour of Bodies, and the variable Colour of the Cameleon explained.

39 Observations relating to the Nature of changeable Silks, &c. and to the peculiar Phænomena of Lignum Nephriticum.

40 Several Phænomena observed in diving.—The blue Colour of the Sky, and the peculiar Appearance of the Evening Clouds, accounted for.

41 The Phænomena of the Rain-Bow explained and illustrated.

42 The Nature and Phænomena of FLAME.

43 Conclusion of the Doctrine of Heat.

P A R T II.

O F A I R.

Lecture
VII.

- 1 **T**HE Properties of common AIR explained.
- 2 The Mechanism of the EAR, and the Provisions in that Organ for the Regulation of Sounds, explained and illustrated.
- 3 Of SOUND in general, and how produced.
- 4 How the *Intenseness* of Sound is estimated at different Distances from the sounding Body.
- 5 The *Velocity* of Sound uniform, and all Sounds move with the same Velocity.
- 6 Observations relating to the Mensuration of Distances by Means of Sound, and to the Celerity of Sound in different Seasons of the Year and in different Climates.
- 7 How the Celerity and Loudness of Sound are affected by Wind, the Air's Density, the Climate, and Season of the Year, &c.
- 8 Of ECHO in general.—Some Echos repeat more Syllables than others.—Why an Echo may several Times repeat the same Sound.
- 9 Rules for finding the Echo of a given Sound, and for discovering the Distance of the echoing Body from the Observer.
- 10 The Theory of the speaking and *Ear Trumpets*.—The best Form of these Instruments.
- 11 Of *musical Sounds* in general.—The Cause of different Tones.—The Theory of Concord and Discord.—Explanation of some remarkable Phænomena.

Lecture
VIII.

- 12 Of the *electrical Fluid* and its Properties.

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- 13 The **ELECTRICITY** of the Clouds, and the Cause of **THUNDER** and **LIGHTNING** explained.
 - 14 The *Distance* of Thunder how estimated.—The rumbling Noise of Thunder accounted for.—The Earth not struck by every Peal of Thunder.
 - 15 Of securing Buildings, &c. from the Effects of Lightning, and of eligible Situations during a Thunder-Storm.
 - 16 Of **WINDS** in general.—Winds classed and subdivided.—Their History imperfect.
 - 17 Of *variable* Winds, and a new Theory to account for them.
 - 18 The true Cause of the *Trade Winds* explained and illustrated.
 - 19 Of the Trade Winds in the Atlantic and Pacific Ocean.
 - 20 Of *periodical* Winds in general.
 - 21 Of the Sea and Land Breezes in the torrid Zone.
 - 22 Of *Monsoons*, their History and Cause.
 - 23 Of the *Winds* and *Tornados* on the Coast of Africa.
 - 24 Observations concerning the Transparency of the Atmosphere. Lecture IX.
 - 25 Of **MISTS** and **CLOUDS** in general.
 - 26 Of the Appearance, Constitution, and Height, of the Clouds.
 - 27 Of **RAIN**.—A new Theory to account for it.
 - 28 How far the Changes of the Weather may be predicted by the Barometer.
 - 29 Of **SNOW** in general.
 - 30 Of the Line of perpetual **FROST**.
 - 31 Of the Density of Snow, and the Constitution of the superior Clouds.
 - 32 Of **HAIL**, and why it seldom *snows*, but often *hails*, in the Summer-Season.
 - 33 Of the Size of Hail-stones, and the Noise preceding and attending violent Showers of Hail.

- 34 OF WHIRLWINDS—their Cause and Phenomena.
- 35 OF WATER SPOUTS—their Cause, Phenomena, and natural History.
- 36 Miscellaneous Facts and Observations.
- a Air, and all transparent Bodies, less heated by the Rays of the Sun than those that are opaque.
- b Heat of a Climate not wholly dependent on its Latitude—several other Causes of it pointed out and considered.
- c The Heat, produced by the Sun in the Planets and Comets, greatly depends upon the Constitution of their Atmospheres.
- d The Use of Air in Respiration explained and illustrated.
- e Causes which corrupt the Air, and the Provisions in Nature for purifying it.

P A R T III.

OF CORPUSCULAR AND ELECTIVE ATTRACTIONS, AND OF SALINE SUBSTANCES.

Lecture
X.

- 1 CORPUSCULAR ATTRACTION—its Universality demonstrated.—Hardness, Softness, and other Modifications of Matter, explained and illustrated.
- 2 Transmigration of Matter proved.
- 3 ELECTIVE Attraction—simple and compound.—Phenomena depending upon it explained.
- 4 SOLUTION and PRECIPITATION considered and illustrated.
- 5 SALINE SUBSTANCES defined—their general Properties.—The Theory, Phenomena, and Uses, of Crystallization.
- 6 The Formation of ICE.—Effects of FROST in pulverising the Soil, rending Trees, &c.

7 The

7. The Difference between ACIDS and ALKALIES, how they may be discovered and distinguished;

Lecture
XI.

8. ALKALIES classed and subdivided;—Of *Fossil*, *Vegetable*, and *Volatile* Alkalies.

9. ACIDS classed and subdivided.

10. *Mineral* Acids—the vitriolic, nitrous, and muriatic.

11. *Vegetable* Acids—Vinegar, Tartar, &c.

12. Of *Effervescence* and *Saturation*, and of NEUTRAL SALTS in general.

13. NITRE, its Properties and natural History.

14. Gunpowder and *Pulvis Fulminans*—their Theory and Preparation.

15. COMMON SALT—its Decomposition, Crystallization, and Decrepitation—septic, or antiseptic, according as applied in small or large Quantities—its Salubrity to Man, and other Animals, proved by several Facts—its Effects as a Manure considered—its natural History.

P A R T IV.

OF EARTHS.

1. THE ANIMAL, VEGETABLE, and MINERAL, Kingdoms defined.

Lecture
XII.

2. The internal Structure of the EARTH.

3. Of the Strata in general.

4. Of the Situation and Extent of the Strata.

5. Of the *Fissures* or perpendicular Divisions of the Strata.

6. Of the *Trapping down* of the Strata.

7. Of the Situation of the Strata in *mountainous* Countries.

8. Concerning

- 8 Concerning the *Origin* of the Irregularities observable in the Structure of the Earth.
- 9 Of EARTHQUAKES and BURNING MOUNTAINS in general.—An Attempt to shew that both are the Effect of the *same* CAUSE.—This Cause explained and illustrated.
- 10 Of the *Phænomena* of Earthquakes, and of the Rules for finding the Depth and Situation of the *Fires* producing them.—Their Effects and History.
- Lecture XIII. 11 Of EARTHS in general.
- 12 Earths classed, and how divided into *silicious*, *absorbent*, *argillaceous*, *talky*, and *fusible*.
- 13 SILICIOUS EARTH, and its general Properties.
- 14 *Precious Stones*—their Formation—Analysis, and natural History.—Observations on some peculiar Properties of the *Diamond*.
- 15 Of *Glass*, the Process of making it—its Imperfections how remedied—remarkable Property of it explained on new Principles.—Of the *flexible* Glass of the Ancients.
- 16 Of ABSORBENT EARTH.—Several Kinds of it.
- 17 CALCAREOUS EARTH—its Characters and Calcination.—Theory of *Quicklime* and of *Mortar*.—Remarkable Property of Quicklime combined with Linseed-Oil.
- 18 Of GYPSOM, and the various Forms under which it is found.—Its Nature and Uses.
- 19 MAGNESIA, *crude* and *calcined*—its Preparation and History.
- 20 Of CLAY—its Characters and Analysis.
- 21 Marls—their Analysis and History.
- 22 Of TALKY EARTH.—*Asbestos*, and the Method of making *incombustible* Cloth.
- 23 FUSIBLE EARTH—its Characters and History.—A remarkable Effect of its Acid upon Water.

PART V.

OF METALS.

1 **METALLIC SUBSTANCES** defined—how distinguished into perfect, imperfect, and Semi-Metals.

Lecture
XIV.

2 **Theory and Process of calcining Metals.**—Metallic Calces and their Reduction.

3 **Some general Observations relating to metallic Ores.**

4 **ARSENIC**—its Nature and Properties—its poisonous Effects on the human Body, how detected—its natural History.

5 **OF QUICKSILVER**—its Freezing and other Properties—its Combination with Salt and other Substances—its natural History.

6 **OF ANTIMONY**—its Uses and natural History.

7 **OF BISMUTH**—its Properties and Uses.—*Pearl White*, an improper Cosmetic.—Natural History of Bismuth.

8 **ZINC**—its Flowers—its Uses in the Composition of Prince's Metal, Pinchbeck, Brass, &c.—Its natural History.

9 **COBALT**—its Characters and Uses—a curious sympathetic Ink prepared from it.—Its natural History.

10 **Of Nickel**, its Properties and natural History.

Imper-

Imperfect Metals.

- Lecture XV.** 11 Of LEAD—of red Lead—of Litharge—Glaſs of Lead—Vitriol of Lead—Plumbum Corneum—Nitre of Lead—white Lead—Sugar of Lead—the Method of caſting Lead-Shot—the Medical Hiſtory of Lead—how Lead may be diſcovered in Liquors—its natural Hiſtory.
- 12 Of TIN—its Fuſion—Granulation and Calcination—Putty and Powder of Tin—Action of Acids upon Tin—Uſes of Tin in the Art of dying—Composition of Bell-Metal—Tinning of Mirrors.—Tin-plates how prepared—Natural Hiſtory of Tin.
- 13 Of Copper—its Calcination—its Combination with Acids—how detected in Solution—of Verdigris—blue Vitriol.—Medical and natural Hiſtory of Copper.
- Lecture XVI.** 14 Of Iron—its natural Hiſtory—of caſt and forged Iron.—The ancient and modern Methods of making Steel—Obſervations relating to the tempering of Steel—Why many hard Bodies elicit Sparks from Steel — The Combination of Iron with Acids.—Green Vitriol.—Pruſſian Blue.—Of Inks, common and ſympathetic.—Iron the only Subſtance attracted by the Magnet—capable of becoming a Magnet.—Of natural and artificial Magnets.

Perfect Metals.

- Lecture XVII.** 15 Of SILVER—its Fuſion—its Combination with Acids—lunar Crystals—lunar Cauſtic—Luna Cornea—Diana's Tree.—Of alloying Silver—of the Purification of Silver, and the Method of expreſſing its Purity.—Natural Hiſtory of Silver.

- 16 Of GOLD—its great specific Gravity—Malleability, Ductility, and Opacity—its Fusion—its Solution in Aqua Regia and Hepar Sulphuris—potable Gold—the Theory and Preparation of Aurum Fulminans—its Force compared to that of Gunpowder—of the purple Powder of Cassius, and its Uses—of alloying Gold—of purifying Gold, and expressing its Purity—Quartation.—Medical History of Gold—Methods of extracting Gold from its Ores.
- 17 Of PLATINA—its Characters compared with those of Gold—how affected by Heat and Acids—Phænomena attending its Solution in Aqua Regia—its Combination with Metals—different Methods of discovering it when combined with Gold.
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P A R T VI.

O F W A T E R.

- 1 **O**F WATER in general—the Opinions of Philosophers concerning it—of hard and soft Waters. Lecture XVIII.
- 2 The Advantages and Disadvantages of *hard* Water, and the Methods of softening it.—Of *petrifying* Waters, and the Theory of Petrification.
- 3 Of *soft* Water—Observations concerning its Uses in Medicine, in the Arts, and in common Life.
- 4 Of MINERAL WATERS—their Analysis and general Contents.—Of *Buxton, Bath, Harrogate, Bristol, Pyrmont* Waters, &c.
- 5 Of SEA-WATER in general, and its Contents—various Opinions with Regard to the Origin of its Saltness.—Ice of Sea-Water not salt.—Methods of making Sea-Water fresh.

P A R T VII.

OF VEGETABLE SUBSTANCES.

Lecture
XIX.

1 **O**F VEGETATION—the Food of Plants—different Opinions concerning it.—The Analogy betwixt Plants and Animals.

2 The Effects of *Light* upon Vegetables.—*Nourishment* they draw from the Atmosphere.—Their *Perspiration* compared with that of Animals.

3 Observations and Facts concerning the *Instinct* of Plants.

4 The *Analysis* and constituent Parts of Vegetables.

5 Of GUMS—their Properties and Uses.

6 Of UNCTUOUS OILS—their Characters—Principles—and Combinations with Salts and other Substances.—Soap, and its Properties.

Lecture
XX.

7 Of ESSENTIAL OILS—their Characters and Uses—their Sophistication, and how detected.

8 Of BALSAMS and RESINS in general.—Tar and Tar-Water.—The Uses of Resins.

9 Of CAMPHIRE—its Properties and natural History.

10 A general View of BITUMINOUS Substances.—Naphtha—Jews Pitch—Amber—Ambergris.—Their Principles and natural History.

11 Of *Pit-Coal*—its Analysis.—Observation and Conjectures relating to its Origin.

12 Of the ESSENTIAL SALTS of Vegetables.—SUGAR—Method of refining it—its Crystallization—the Properties and Medical History of Sugar.

13 Of TEA—its natural History—Imperial, Green, Bohea, &c.—different Opinions concerning its Effects on the Animal Economy.

- 14 Of the *farinaceous* Parts of Vegetables;
 - 15 Of FERMENTATION in general—its vinous, acetous, and putrid, Stages.
 - 16 Of BREAD—the Methods and Advantages of fermenting it.
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P A R T VIII.

OF ANIMAL SUBSTANCES.

- 1 **O**F ALIMENT, DIGESTION, and NUTRI- Lecture
XXI.
MENT.
- 2 *Analysis of animal Substances.*—Their ultimate Principles compared with those of Vegetables.
- 3 Of BLOOD—its Serum, coagulable Lymph, and Crassamentum.—Its living Principle considered.
- 4 Of SALIVA—its Properties and Uses in the animal Œconomy.
- 5 Of the PANCREATIC JUICE—its Properties and Uses.
- 6 Of BILE—its Analysis, Properties, and Uses.
- 7 Of MILK in general—of Cream—of Butter—of Cheese—of Whey—of the Salt of Milk.
- 8 Of BEES-WAX—its Analysis—Method of whitening it.
- 9 HONEY—its natural History—and Observations concerning it.
- 10 Of LAC—and other animal Productions of a similar Nature.



14 Of the various Parts of Vegetables
 15 OF FERMENTATION in general, its various
 sections, and parts, &c.
 16 OF BREAD—the Methods and Advantages of its
 making it.

PART VIII.

OF ANIMAL SUBSTANCES.



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 XXI

- 1 OF MEN—its various Parts, and the Principles of its Constitution.
- 2 OF BLOOD—its various Parts, and the Principles of its Constitution.
- 3 OF SALIVA—its Properties and Uses in the human Economy.
- 4 OF THE PANCREATIC JUICE—its Properties and Uses.
- 5 OF URINE—its various Parts, Properties, and Uses.
- 6 OF MILK in general—of its various Parts, and of its various Uses.
- 7 OF BEES—WAX—its Analysis—its various Uses.
- 8 OF HONEY—its various Properties, and its various Uses.
- 9 OF GELATINE—its various Properties, and its various Uses.
- 10 OF GLASS—its various Properties, and its various Uses.